DARWIN
Aerospace InfoStructure

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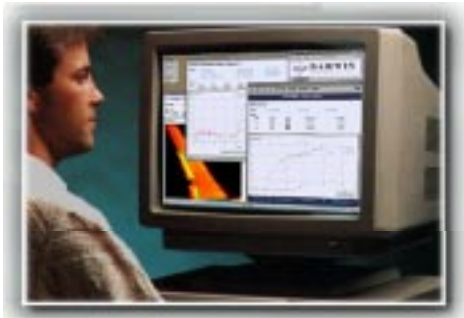
NASA ARC IPG Workshop   September 20, 2000

Motivation

Original Problem:

- Wind tunnel test engineers had to be on site to monitor test progress

- Results were on tape and in hardcopy binders

- Comparing data across instrumentation and across tests was difficult
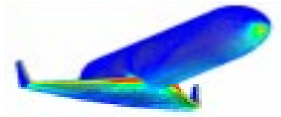
Goal:

To provide a secure, timely, data management system that allows scientists/engineers to browse, query, analyze and compare aerospace data while at remote, distributed locations.
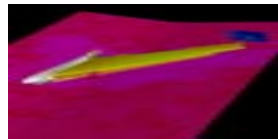
Customers

Aerospace CFD Data

Wind Tunnel Test Data

Adv Instrument Data

Flight Test Data

Flight Simulation Data

EOS Data

- Aerospace CFD Data
  - SHARP program
    - Solvers: GASP, UPS
  - CGNS compatible codes
- Wind Tunnel Test Data
  - ARC: Unitary, NFAC, ArcJet,
  - LaRC
  - MSFC
- Advanced Instrument Data
  - PSP, TSP, VMD, PIV, PMAT
- Flight Test Data
  - AeroSAPIENT
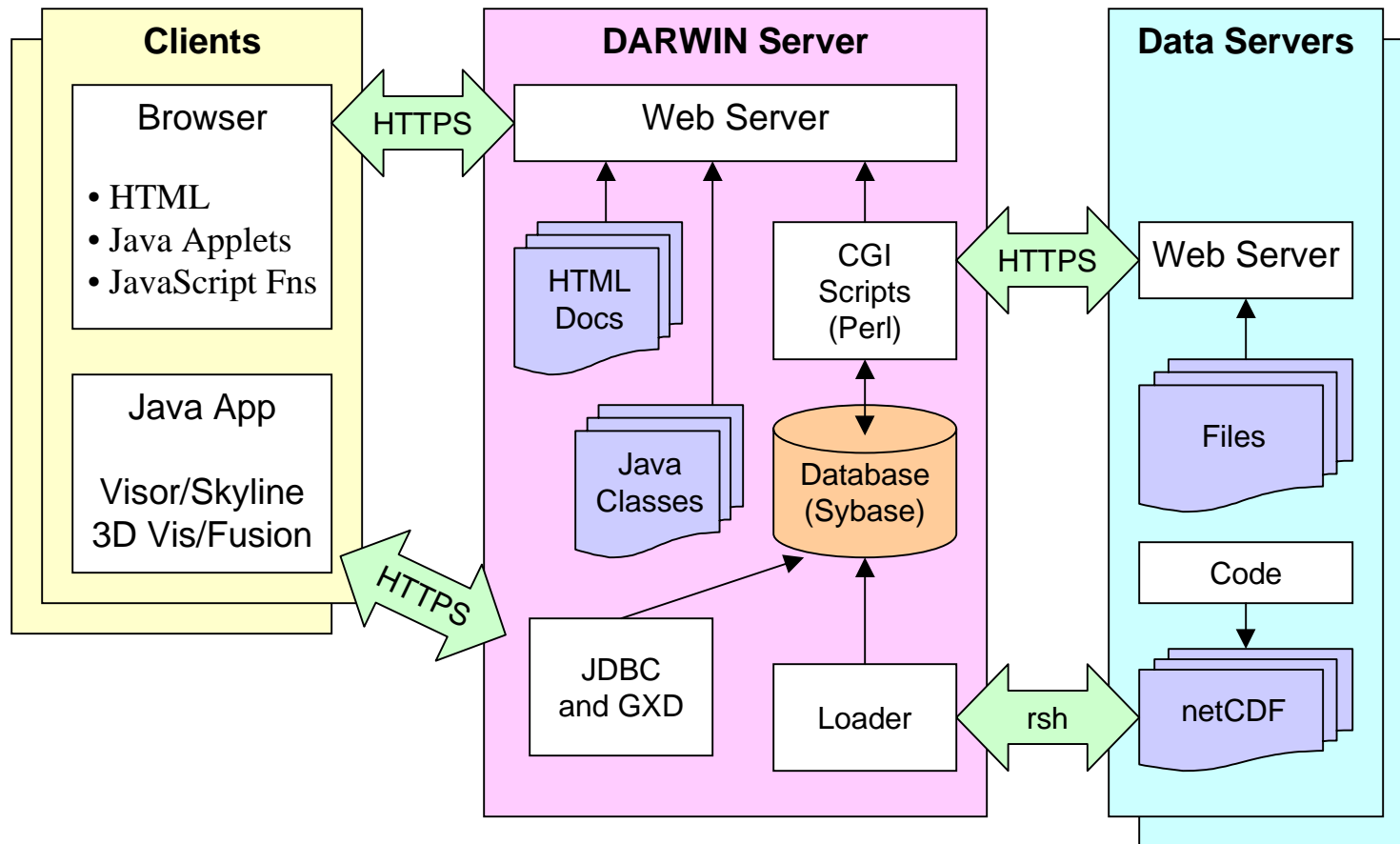- Flight Simulation Data
- EOS Data

Implementation

- ## Developments in first four years (1996 - 1999)

    - Cross-data comparisons

    - User management workspace and dataviews

    - "Live" data feed with self-updating displays

    - Collaboration tools (message board and file exchange)

    - Experimental and CFD data

    - Application-like user interface

- ## All developments were accomplished within the original architecture, i.e., Perl CGI scripts on server, Netscape browser on client.

Implementation

Secure web-based architecture running over a wide-area network.

Implementation

OAW Review　　　　　　　　　　　Edit Dataset

Plots

Plot:

Plot #4

CL_Stab

0.25

0.2

0.15

0.1

0.05

0.0

-0.05 -1.0　0.4　1.8　3.2　4.6　6.0

Alpha

0.005

0.01

0.015

0.02

0.025

0.03

CD_Stab

5 ▼
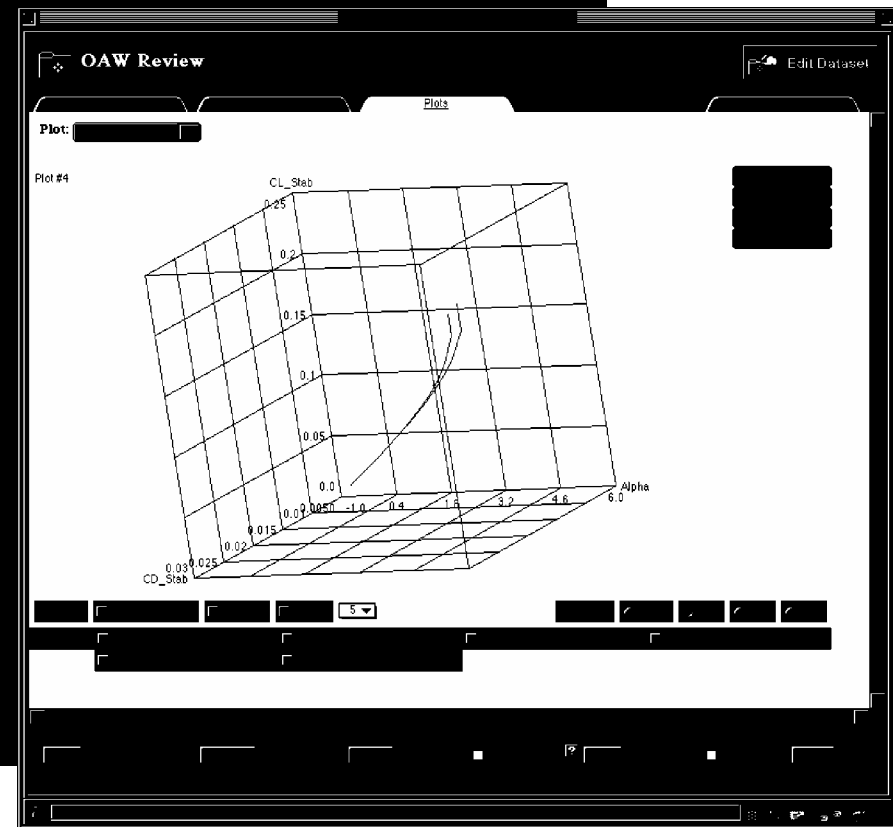
Metadata Activity

- ## Meta-Database

  - Capture wider range of data types

    - Redesigned schema and integrated with DARWIN v2.5 (1999)

  - Manage large datasets

    - Operations database currently contains close to 40 million values of several thousand variables

    - Developing solutions for optimizing performance during access and input and modification

  - Coordinate with Peer distributed, remote databases and file-systems

Updated Requirements

- ## Distribution of server-side elements

  - ### Multiple data servers

    - Each wind tunnel requires its own data server

  - ### Multiple meta-databases

    - Installation at new sites (LaRC, MSFC) will require additional meta-databases

  - ### Multiple user databases

    - New sites want to manage their own user databases

  - ### Multiple web servers

    - Strategically placing DARWIN web servers will help minimize network latency issues
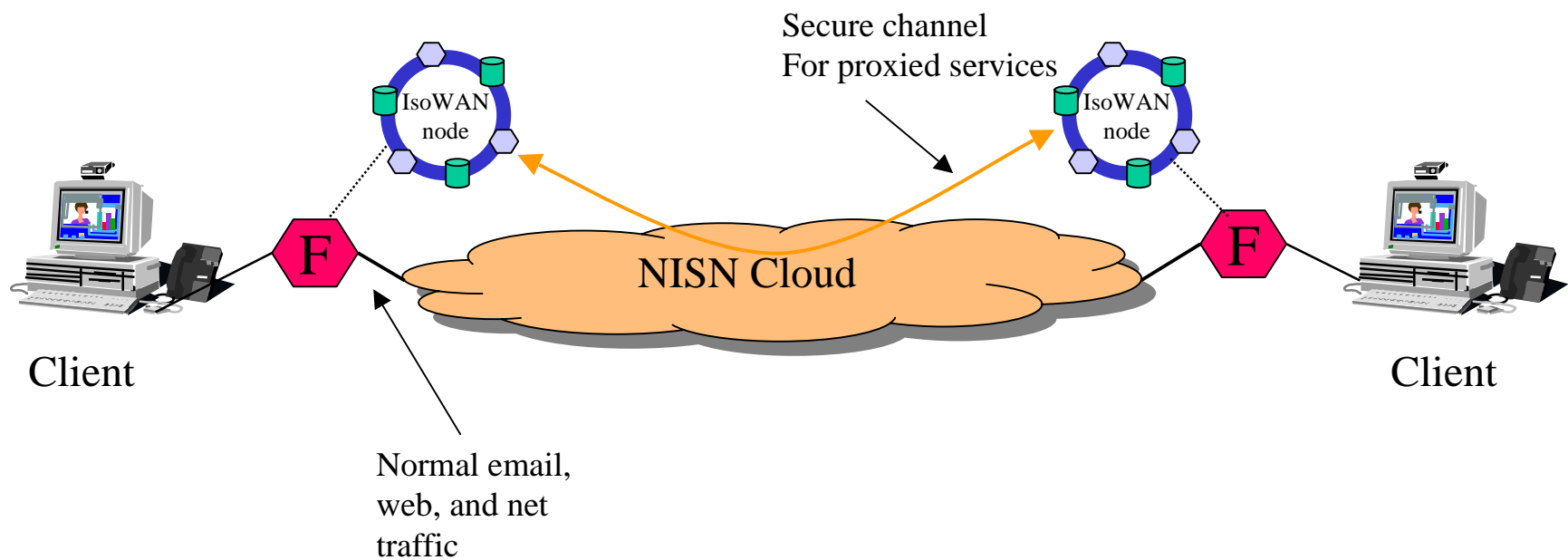
InfoStructure Architecture
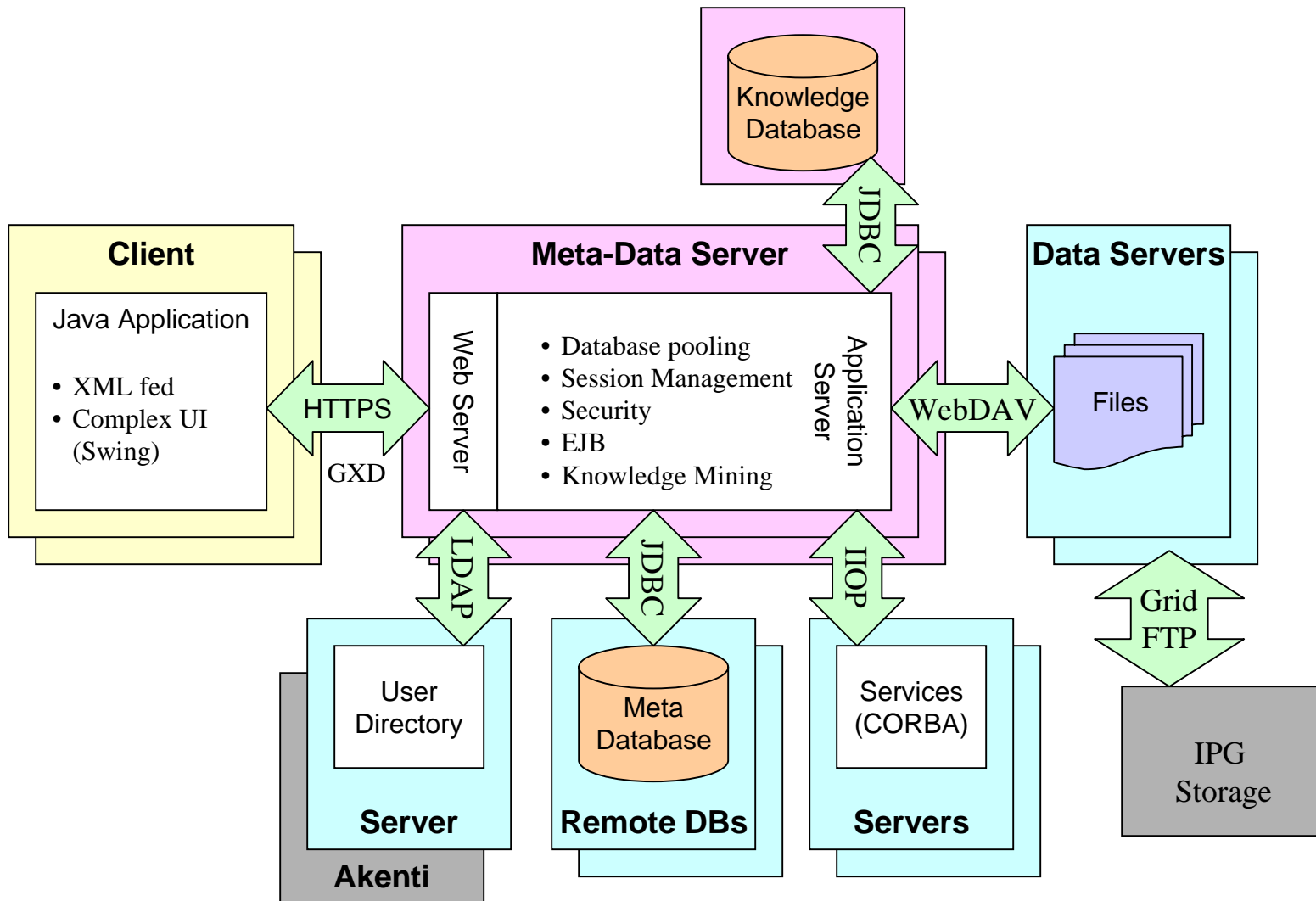
Desired Grid-like Technologies

- Remote Access to Distributed files
  - GridFTP?
  - Using http and WebDAV, DFS
  - Read, not Copy

- Network
  - Automatic bandwidth allocation
  - Secure point to point connections, IsoWAN

- Authentication and Access Control
  - Akenti/LDAP
  - MDS

IsoWAN Services

Secure channel
For proxied services

IsoWAN node

IsoWAN node

NISN Cloud

Client

Client

Normal email, web, and net traffic

IsoWAN Concept

High speed interconnected proxy Nodes supporting NASA-wide services
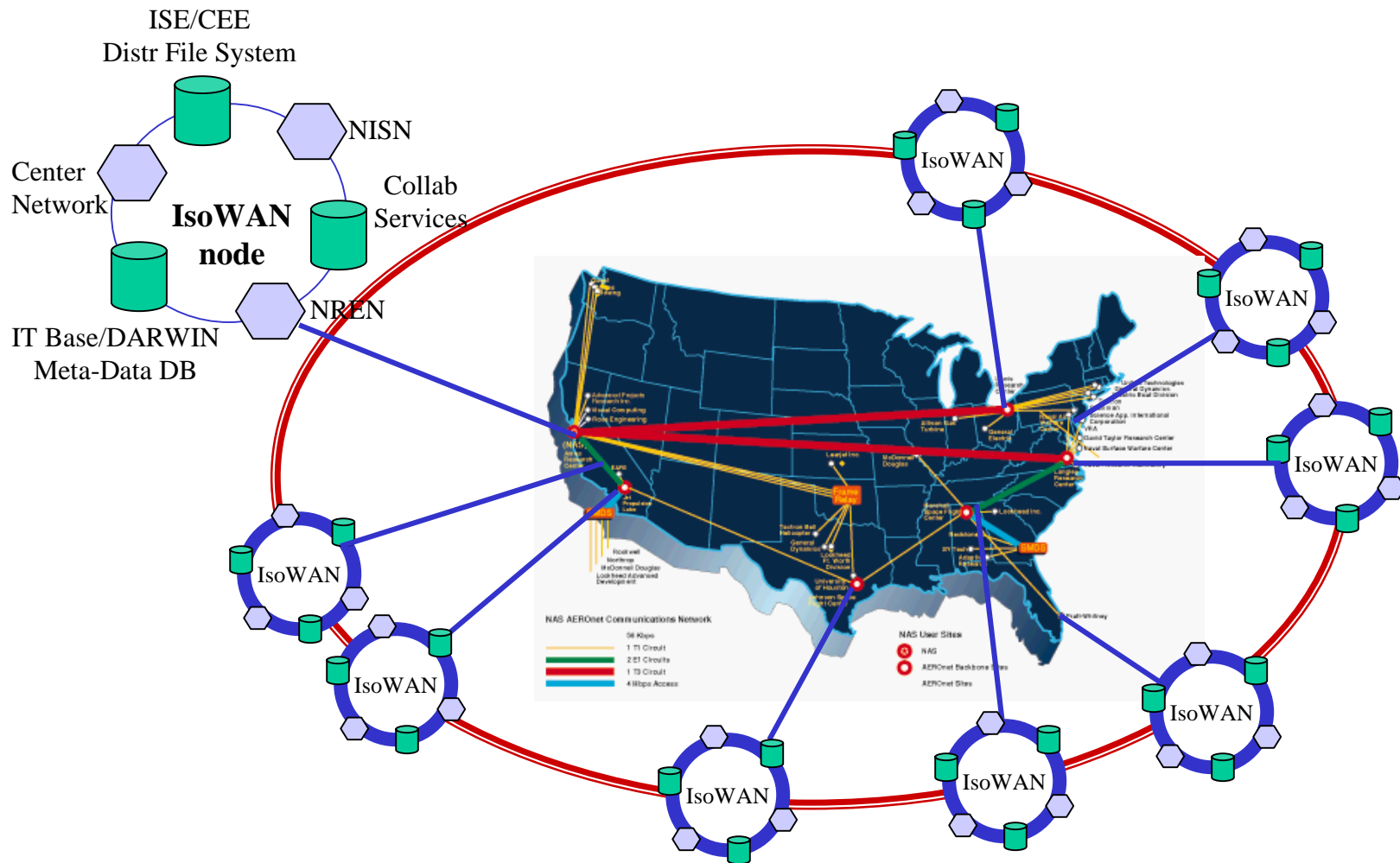
THE END

DARWIN – IsoWAN connectivity

ARCLan
Client

LaRC
Client

*arc.isowan.nasa.gov

**IsoWAN
Node**

R

R

R

NISN Cloud

R

IPsec
VPN

*jpl.isowan.nasa.gov

**IsoWAN
Node**

R

R

https only

https only

ARC Networks

LaRC Networks

DARWIN Server
on Secure
Network

*https and j/ODBC
IPSec Encryption*
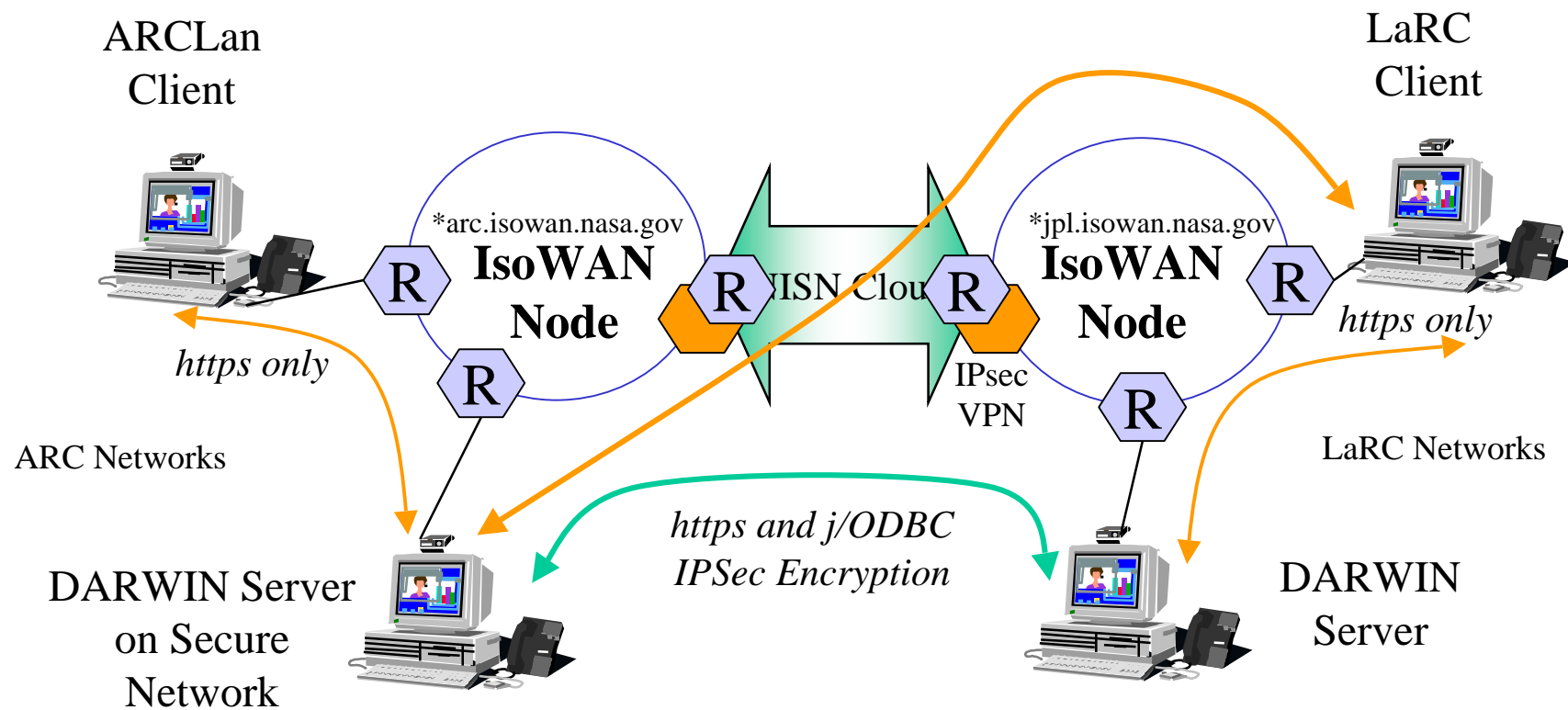
DARWIN
Server

DARWIN – Current connectivity

ARCLan
Client

LaRC
Client

*darwin.nasa.gov

**DARWIN
IsoLAN**

R

R

R

NISN Cloud

R

https only

https only

ARC Networks

LaRC Networks

DARWIN Server
on Secure
Network
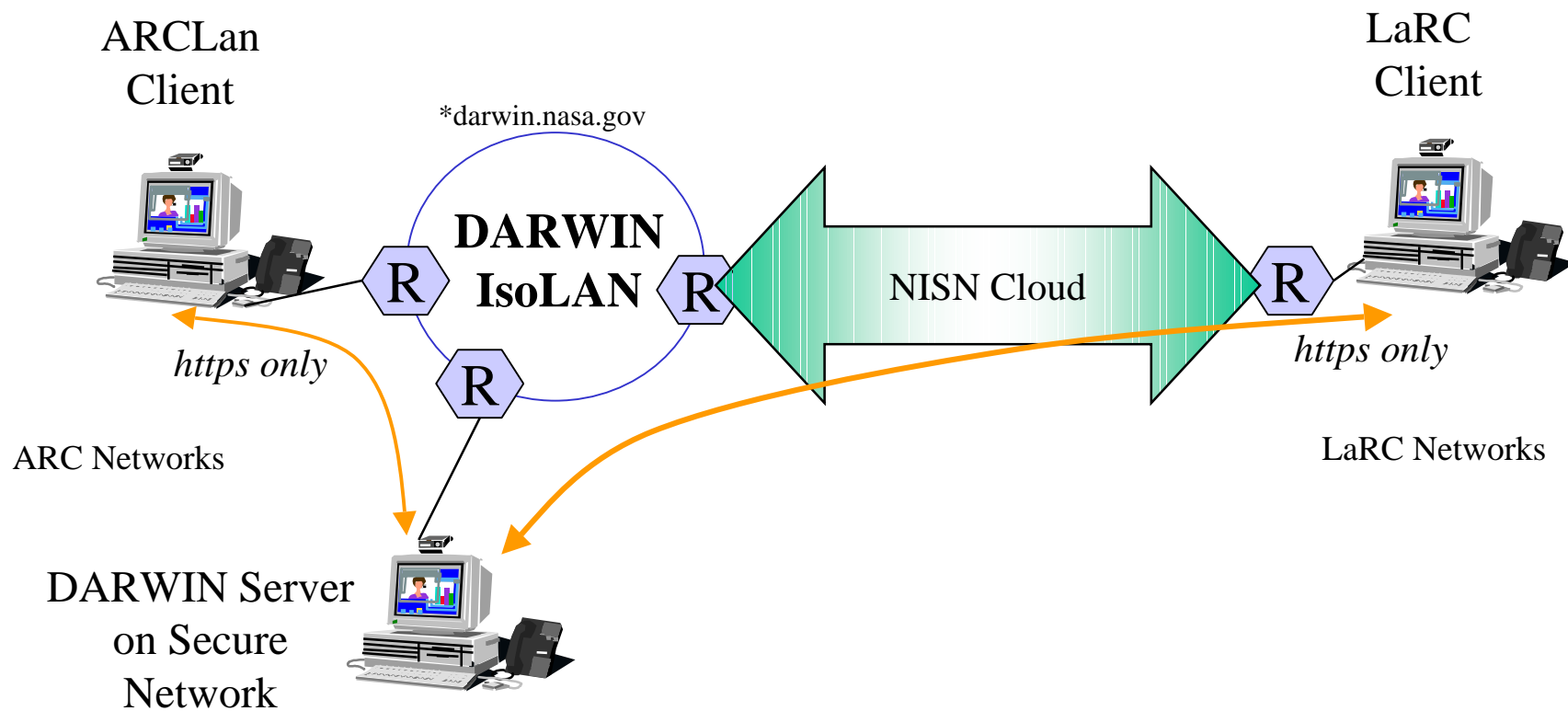
DARWIN – Proposed connectivity

ARCLan
Client

LaRC
Client

*darwin.nasa.gov
**DARWIN
IsoLAN**

R

R

NISN Cloud

R

**DARWIN
IsoLAN**

R

R

R

https only

https only

ARC Networks

LaRC Networks

DARWIN Server
on Secure
Network

https and j/ODBC
w/encyption

DARWIN
Server